H0536

RECRA ENVIRONMENTAL INC.

0053560

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report
****REVISION****

Client : TNU-HANFORD B99-078
RFW# : 9909L101
SDG# : H0536
SAF# : B99-078

W.O. # : 10985-001-001-9999-00
Date Received: 09-03-99

INORGANIC CASE NARRATIVE

This package was revised to add Appendix A.

1. This narrative covers the analyses of 7 soil samples. A method detection limit (MDL) determination was performed for Hydrazine. The information pertaining to the MDL study is provided within the data package.

2. The samples were prepared and analyzed in accordance with the methods checked on the attached glossary.

3. Sample holding times as required by the method and/or contract were met.

4. The method blank for Hydrazine was within method criteria.

5. The Laboratory Control Samples (LCS) for Hydrazine were within the laboratory control limits. The duplicate LCS was within the 20% Relative Percent Difference (RPD) control limit.

6. The replicate analysis for Percent Solids was within the 20% RPD control limit.

7. Results for the MDL study were reported on a wet weight basis.

for J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

6-6-00
Date

njp&pef\i09-101

Recra LabNet Philadelphia

WET CHEMISTRY
METHODS GLOSSARY FOR SOIL/SOLIDS SAMPLE ANALYSIS

	ASTM	SW846	OTHER
% Ash	__ D2216-80		
% Moisture	__ D2216-80		__ ILMO4.0 (e)
% Solids	✓ D2216-80		__ ILMO4.0 (e)
% Volatile Soilids	__ D2216-80		
ASTM Extraction in Water	__ D3987-81/85		
BTU	__ D240-87		
CEC		__ 9081	__ c
Chromium VI		__ 3060A/7196A	
Corrosivity __ by coupon __ by pH		__ 1110(mod) __ 9045C	
Cyanide, Total		__ 9010B	__ ILMO4.0 (e)
Cyanide, Reactive		__ Section 7.3	
Halides, Extractable Organic		__ 9020B	__ EPA 600/4/84-008
Halides, Total		__ 9020B	__ EPA 600/4/84-008
EP Toxicity		__ 1310A	
Flash Point		__ 1010	
Ignitability		__ 1010	
Oil & Grease		__ 9071A	
Carbon, Total Organic		__ 9060	__ Lloyd Kahn (mod)
Oxygne Bomb Prep for Anions	__ D240-87(mod)	__ 5050	
Petroleum Hydrocarbons, Total Recoverable		__ 9071	__ EPA 418.1
pH, Soil		__ 9045C	
Sulfide, Reactive		__ Section 7.3	
Sulfide		__ 9030B(mod)	
Specific Gravity	__ D1429-76C/	__ D5057-90	
Sulfur, Total		__ 9056	
Synthetic Prpearation Leach		__ 1312	
Paint Filter		9095A	

Other: Hydrazine **Method:** Gas Trap Method: F33615-84-D-4400/0016

Other: **Method**

Recra LabNet Philadelphia
METHOD REFERENCES AND DATA QUALIFIERS

DATA QUALIFIERS

U = Indicates that the parameter was not detected at or above the reported limit. The associated numerical value is the sample detection limit.

* = Indicates that the original sample result is greater than 4x the spike amount added.

ABBREVIATIONS

MB = Method or Preparation Blank.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
REP = Sample Replicate
LC = Laboratory Control Sample.
NC = Not calculated.

A suffix of -R, -S, or -T following these codes indicate a replicate, spike or sample duplicate analysis respectively.

ANALYTICAL WET CHEMISTRY METHODS

1. ASTM Standard Methods.

2. USEPA Methods for Chemical Analysis of Water and Wastes (USEPA 600/4-79-020).

3. Test Methods for Evaluating Solid Waste (USEPA SW-846).

a. Standard Methods for the Examination of Water and Waste, 16 ed, (1983).

b. Standard Methods for the Examination of Water and Waste, 17 ed, (1989)/18ed (1992).

c. Method of Soil Analysis, Part 1, Physical and Mineralogical Methods, 2nd ed, (1986).

d. Method of Soil Analysis, Part 2, Chemical and Microbiological Properties, Am. Soc. Agron., Madison, WI (1965).

e. USEPA Contract Laboratory Program, Statement of Work for Inorganic Analysis.

f. Code of Federal Regulations.

1999 Wet Chemistry MDLs

PARAMETER	Methods	Date	Analyst	spike ppm	1	2	3	4	5	6	7	units	Ave	SD	MDL WATER (mg/L)	SOIL FACTOR	MDL SOIL (mg/Kg)
Hydrazine (color) soil ***	Air force method	10/13/99	RDB	2.50	(0.00)	2.95	1.92	1.88	2.81	1.81	1.17	mg/Kg	2.09	0.672	NA	1.0	2.3

* For Hydrazine, sample #1 appears to have not been spiked, and has been excluded from the statistics as an outlier. The MDL is calculated from the other 6 values, using the student t-factor for 6 measurements.

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0W9P9	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.0	u	MG/KG	1.0	1.0
-002	B0W9R0	% Solids	88.6		%	0.01	1.0
		Hydrazine	3.0		MG/KG	1.0	1.0
-003	B0W9R1	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.9		MG/KG	1.0	1.0
-004	B0W9R2	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.9		MG/KG	1.0	1.0
-005	B0W9R3	% Solids	88.6		%	0.01	1.0
		Hydrazine	2.8		MG/KG	1.0	1.0
-006	B0W9R4	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.8		MG/KG	1.0	1.0
-007	B0W9R5	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.2		MG/KG	1.0	1.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	99LHZ002-MB1	Hydrazine	1.0 u	MG/KG	1.0	1.0

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
BLANK10	99LHZ002-MB1	Hydrazine	5.0	1.0 u	5.0	99.1	1.0
		Hydrazine MSD	5.0	1.0 u	5.0	100.5	1.0

Recra LabNet - Lionville

INORGANICS DUPLICATE SPIKE REPORT 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%DIFF
BLANK10	99LHZ002-MB1	Hydrazine	99.1	100.5	1.4

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-007REP	B0W9R5	% Solids	88.6	89.5	1.0	1.0

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD B99-078

DATE RECEIVED: 09/03/99 RFW LOT # :9909L101

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B0W9P9						
% SOLIDS	001	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	001	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R0						
% SOLIDS	002	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	002	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R1						
% SOLIDS	003	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	003	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R2						
% SOLIDS	004	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	004	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R3						
% SOLIDS	005	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	005	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R4						
% SOLIDS	006	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	006	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R5						
% SOLIDS	007	S	99L%S124	09/01/99	09/17/99	09/20/99
% SOLIDS	007 REP	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	007	S	99LHZ002	09/01/99	10/13/99	10/13/99
LAB QC:						
HYDRAZINE	MB1	S	99LHZ002	N/A	10/13/99	10/13/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD B99-078

DATE RECEIVED: 09/03/99 RFW LOT # :9909L101

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
HYDRAZINE	MB1 BS	S	99LHZ002	N/A	10/13/99	10/13/99
HYDRAZINE	MB1 BSD	S	99LHZ002	N/A	10/13/99	10/13/99

(8) perrone

RECRA LabNet Use Only

9909L101

Custody Transfer Record/Lab Work Request

RECRA LabNet

C1

Client TWL-Hanford B99-078
Est. Final Proj. Sampling Date
Project # 10985-001-001-9999-00
Project Contact/Phone #
RECRA Project Manager DS
QC spec Del std TAT 30 days
Date Rec'd 9/15/99 Date Due ~~10/15/99~~ 9/22/99 10/3/99
Account # 9/3/99

Refrigerator #

#/Type Container	Liquid						6							
	Solid						4							
Volume	Liquid						20							
	Solid													
Preservatives														

ANALYSES REQUESTED →

ORGANIC				INORG	
VOA	BNA	Pest/ PCB	Herb	Metal	CN

RECRA LabNet Use Only

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	1412W								
001	BØW9P9			S	9/1/99	0736	✓								
2	RØ														
3	R1														
4	R2														
5	R3														
6	R4														
7	R5														

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:

Saf# B99-078

COMPOSITE WASTE

DATE/REVISIONS:

1. Run matrix QC
2. 9/23/99 Date rec'd - 9/3/99
3. Hydrazine MDL Study
4.
5. Samples relogged from
6. batch 9909L007-99PM229

RECRA LabNet Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___
Airbill # _____
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec't Y or N

Discrepancies Between Samples Lables and COC Record? Y or N
NOTES:

Relinquished by	Received by	Date	Time
Reloy	Jonson	9/15/99	—

Relinquished by	Received by	Date	Time
	ORIGINAL		
	REWRITTEN		

Appendix A

H0536 Hydrazine MDL Study:
Raw Data and Analytical Method Information

RECRA
LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

19 October 1999

Joan Kessner
Bechtel Hanford, Inc.
2355 Stevens Drive
Building 1162
Richland, WA 99352

Reference: Hydrazine MDL Study
SAF# B99-078, SDG# H0536

Dear Ms. Kessner:

Attached is a summary of results and raw data for the referenced project. Also included is the final hydrazine method used for the MDL study and notes on the minor method modifications needed to overcome matrix problems observed in preliminary tests with the site soils.

It appears that the modified U.S. Air Force method will measure hydrazine concentrations in your soils down to approximately 2 ppm (calculated MDL = 2.3 mg/kg).

Please call me with questions and/or comments.

Sincerely,

Recra Environmental, Inc.

for Carter P. Nulton, Ph.D
Vice President

RESULTS SUMMARY

1999 Wet Chemistry MDLs

PARAMETER	Methods	Date	Analyst	spike ppm	1	2	3	4	5	6	7	units	Ave	SD	MDL WATER (mg/L)	SOIL FACTOR	MDL SOIL (mg/Kg)
Hydrazine (color) soil ***	Air force method	10/13/99	RDB	2.50	(0.00)	2.95	1.92	1.88	2.81	1.81	1.17	mg/Kg	2.09	0.672	NA	1.0	2.3

*** For Hydrazine, sample #1 appears to have not been spiked, and has been excluded from the statistics as an outlier. The MDL is calculated from the other 6 values, using the student t-factor for 6 measurements.

RAW DATA

WESTON Analytics Inorganics Section

Date of Prep: 10/13/99
Date of Analysis: 10/13/99
Worksheet: HYZN1013
Computer #: DARWIN
Directory: INORGANICS
Run Batch: 99LHZ002
Method: AIRFORCE
Analyst: RDB
Instrument: LAMDA B

CALIB DATA
SLOPE: 0.44
INTERCEPT: 0.03
CORRELATION COEFF.: 0.9997

RFW SAMPLE ID	TEST	INST. ABS	INITIAL RESULT	DILUTION FACTOR	C/D	FINAL RESULT	DETECTION LIMIT 0.10	UNITS	REPLICATE ORIG SAMPLE RESULT	REP % DIFF	SPIKE SPIKE LEVEL 0.50	SAMPLE SPIKE AMOUNT	% RECOV	LCS AMT LCS ?	% RECOV	SOILS PREP PREP BATCH	INITIAL SAMPLE WT.	FINAL VOL.	% SOLIDS	ANAL TIME	DATE PREP
99LHZ002-MB1	IHYZNS	0.244	0.496	1	10.0000	4.956	1.000	MG/KG	0.000		0.5	5.000	99.1			99LHZ002	2	20	100.00		
99LHZ002-MB1	IHYZN	0.017	-0.022	1	10.0000	-0.219 u	1.000	MG/KG								99LHZ002	2	20	100.00		
MDL-1	IHYZNS	0.017	-0.022	1	11.2455	-0.246 u	1.125	MG/KG	0.000		0.25	2.811	-8.7			99LHZ002	2.008	20	88.57		
MDL-2	IHYZNS	0.156	0.295	1	10.9937	3.243	1.099	MG/KG	0.000		0.25	2.748	118.0			99LHZ002	2.054	20	88.57		
MDL-3	IHYZNS	0.111	0.192	1	10.9776	2.113	1.098	MG/KG	0.000		0.25	2.744	77.0			99LHZ002	2.057	20	88.57		
MDL-4	IHYZNS	0.109	0.188	1	10.7837	2.026	1.078	MG/KG	0.000		0.25	2.696	75.2			99LHZ002	2.094	20	88.57		
MDL-5	IHYZNS	0.150	0.281	1	11.0000	3.117	1.100	MG/KG	0.000		0.25	2.770	112.5			99LHZ002	2.038	20	88.57		
MDL-6	IHYZNS	0.106	0.181	1	10.8719	1.968	1.087	MG/KG	0.000		0.25	2.718	72.4			99LHZ002	2.077	20	88.57		
MDL-7	IHYZNS	0.078	0.117	1	11.0529	1.296	1.105	MG/KG	0.000		0.25	2.763	46.9			99LHZ002	2.043	20	88.57		
99LHZ002-MB1	IHYZNT	0.247	0.502	1	10.0000	5.025	1.000	MG/KG	0.000	1.4	0.5	5.000	100.5			99LHZ002	2	20	100.00		
CC-MB	IHYZN	0.028	0.063	1	10.0000	0.032 u	1.000	MG/KG								99LHZ002	2	20	100.00		
CC-LC BLK	IHYZN	0.085	-0.049	1	9.8863	-0.487 u	0.989	MG/KG								99LHZ002	2.023	20	100.00		

ANALYSIS OF HYDRAZINE IN SOILS

1. Reagents (All chemical are ACS reagent grade or better)

   1.1 Concentrated sulfuric acid

   1.2 Sulfuric acid, 0.1 N

   1.3 Hydrazine sulfate

   1.4 Acetic acid, glacial

   1.5 Water, distilled or deionized

   1.6 Hydrazine reagent, p-dimethylaminobenzaldehyde (Hydraver II may be purchased from Hach Chemical Co., P.O. Box 907, Ames, IA 50010; Catalog No. 1790 or prepare a 2.5% solution of p-dimethylaminobenzaldehyde in methanol.

2. Procedure

   2.1 On soils, weigh out **2.0 g** and add 20 mL 0.1 N H_2SO_4. Tumble for 30 min. For water samples start here. Filter samples through 0.45 µm Millipore® and take 5 mL for analysis. Place in 25 mL volumetric flask.

   2.2 Add 1 mL of Hydraver II reagent or hydrazine reagent.

   2.3 Swirl the contents of the flasks intermittently for 8 min.

   2.4 Adjust flask volume to 25 mL with the glacial acetic acid reagent.

   2.5 Place stoppers in flask and invert bottle 5-6 times.

   2.6 Allow to sit for 4 min.

   2.7 Filter samples through 0.45 µm Millipore® using 458 nm on the spectrophotometer.

   2.8 Read ABS against blank using 458 nm on the spectrophotometer.

   2.9 Calculations, as on UDMH in soils.

3. Calibrations and Standards

   3.1 Weigh out 0.4060 g of hydrazine sulfate (N_2H_4 H_2SO_4). Dissolve in 500

mL of 0.1 N H_2SO_4 in a 1 L volumetric flask. Bring to volume with 0.1 N H_2SO_4. The resulting solution is 100 mg/mL in hydrazine. Prepare calibration curves using appropriate µL pipettes and the following procedure:

3.1.1 Make 10 ppm hydrazine sulfate daily (10 mL - 100 mg/mL to 100 mL with 0.1 N H_2SO_4.

3.1.2 Pipet 10 mL of 0.1 N sulfuric acid into each of six volumetric flasks.

3.1.3 Carefully pipet 0.05, 0.10, 0.20, 0.40 and 0.50 mL (.1, .2, .5, .8, and 1.0 ppm respectively) of the standard hydrazine solution into the flasks. Process one flask as a blank.

3.1.4 Add 1.0 mL of Hydraver II or hydrazine reagent to each flask.

3.1.5 Set time for 8 min. and swirl each flask intermittently.

3.1.6 After the 8-min. reaction period, bring each flask to 25 mL total volume with glacial acetic acid.

3.1.7 Place stoppers in flasks and invert 5-6 times.

3.1.8 Set timer for 4 min. to allow bubbles to disappear (tap flasks lightly).

3.1.9 Adjust spectrophotometer (458 nm) to 100%T using the blank solution (prepared in the same manner as the unknown samples).

3.1.10 Read sample or absorbance within 3 hours of Hydraver II addition.

3.1.11 Construct a calibration curve by plotting absorbance against total µg of hydrazine in solution.

4. References

See UDMH in Soils Analysis. USAFSAM Report TR-82-29, Field Sampling and Analysis of Hydrazine and UDMH Vapors in Air: The Firebrick Method, USAF School of Aerospace Medicine, Brooks AFB TX 78235-5501. Method modified for soil analysis by Tom Thomas, USAFOEHL, Brooks AFB TX 78235-5501.

NOTES ON MATRIX EFFECTS AND METHOD MODIFICATIONS

Preliminary tests of the method as written and performed by Recra on past projects indicated two matrix specific problems. The first being that the leachate became very turbid after the addition of glacial acetic acid (Step 2.4 in the method). We found that the turbidity could be removed by filtering through a 4.5 µm Millipore® filter (Step 2.7).

A second issue, which became apparent after the turbidity problem had been solved, was that color formation was not observed with a 0.2 ppm spike (a spike level which can be easily observed in clean water and soil samples). Apparently some co-extracted matrix constituents were interfering with color formation. After trying several dilutions and looking at different leaching solutions, we settled on a 10-fold dilution (2 g leached with 20 mL) for the MDL study.

FAX COVER SHEET

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RECRA LabNet
a division of Recra Environmental, Inc.

208 Welsh Pool Road
Lionville, PA 19341-1333
Phone: (610) 280-3000
Fax: (610) 280-3041

DATE: 6/6/00

TIME:

NO. PAGES: 14 **(including cover sheet)**

TO: Joan Kessner

OF:

FAX #:

FROM: Arlette

COPY TO:

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MESSAGE:

#0536 - originally mailed 1/21/2000
please let me know if this
is sufficient to be mailed to
you today

RECRA ENVIRONMENTAL INC.

Chemical and Environmental Measurement Information

21 January 2000

Mr. Kevin Johnson
Thermo NUtech
2030 Wright Avenue
Richmond, California 94804

Subject: TNU-Hanford Contract N501118
Analytical Data Package

Dear Mr. Johnson:

Enclosed are the hard copy analytical reports (original plus 1 copy) for the referenced project listed above and the batch number/fraction indicated (marked X) in the ensuing table:

Recra Batch #	9909L101
SDG #	H0536
SAF #	B99-078
Date Received	09-03-99
# Samples	7
Matrix	Soil
Volatiles	
Semivolatiles	
Pest/PCB	
DRO	
GC Scan	
Metals	
Inorganics	X

The electronic data deliverable (EDD) will be sent separately by way of e-mail to Rich Weiss at Bechtel/Hanford. If you have any questions, please don't hesitate to contact me at (610) 280-3012.

Very truly yours,
RECRA LabNet Philadelphia

Orlette S. Johnson
Project Manager

Enclosure

r:\group\pm\orlette\tnu-hanf\data\bc_ltr.doc

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-078
RFW# : 9909L101
SDG# : H0536
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2. The samples were prepared and analyzed in accordance with the methods checked on the attached glossary.

3. Sample holding times as required by the method and/or contract were met.

4. The method blank for Hydrazine was within method criteria.

5. The Laboratory Control Samples (LCS) for Hydrazine were within the laboratory control limits. The duplicate LCS was within the 20% Relative Percent Difference (RPD) control limit.

6. The replicate analysis for Percent Solids was within the 20% RPD control limit.

7. Results for the MDL study were reported on a wet weight basis.

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

1-20-00
Date

sjp\i09-101

Recra LabNet Philadelphia

WET CHEMISTRY
METHODS GLOSSARY FOR SOIL/SOLIDS SAMPLE ANALYSIS

	ASTM	SW846	OTHER
% Ash	__ D2216-80		
% Moisture	__ D2216-80		__ ILMO4.0 (e)
% Solids	√ D2216-80		__ ILMO4.0 (e)
% Volatile Soilids	__ D2216-80		
ASTM Extraction in Water	__ D3987-81/85		
BTU	__ D240-87		
CEC		__ 9081	__ c
Chromium VI		__ 3060A/7196A	
Corrosivity __ by coupon __ by pH		__ 1110(mod) __ 9045C	
Cyanide, Total		__ 9010B	__ ILMO4.0 (e)
Cyanide, Reactive		__ Section 7.3	
Halides, Extractable Organic		__ 9020B	__ EPA 600/4/84-008
Halides, Total		__ 9020B	__ EPA 600/4/84-008
EP Toxicity		__ 1310A	
Flash Point		__ 1010	
Ignitability		__ 1010	
Oil & Grease		__ 9071A	
Carbon, Total Organic		__ 9060	__ Lloyd Kahn (mod)
Oxygne Bomb Prep for Anions	__ D240-87(mod)	__ 5050	
Petroleum Hydrocarbons, Total Recoverable		__ 9071	__ EPA 418.1
pH, Soil		__ 9045C	
Sulfide, Reactive		__ Section 7.3	
Sulfide		__ 9030B(mod)	
Specific Gravity	__ D1429-76C/	__ D5057-90	
Sulfur, Total		__ 9056	
Synthetic Prpearation Leach		__ 1312	
Paint Filter		9095A	

Other: Hydrazine **Method:** Gas Jar Method: F33615-84-D-4400/0011

Other: **Method**

Recra LabNet Philadelphia
METHOD REFERENCES AND DATA QUALIFIERS

DATA QUALIFIERS

U = Indicates that the parameter was not detected at or above the reported limit. The associated numerical value is the sample detection limit.

* = Indicates that the original sample result is greater than 4x the spike amount added.

ABBREVIATIONS

MB = Method or Preparation Blank.
MS = Matrix Spike.
MSD = Matrix Spike Duplicate.
REP = Sample Replicate
LC = Laboratory Control Sample.
NC = Not calculated.

A suffix of -R, -S, or -T following these codes indicate a replicate, spike or sample duplicate analysis respectively.

ANALYTICAL WET CHEMISTRY METHODS

1. ASTM Standard Methods.

2. USEPA Methods for Chemical Analysis of Water and Wastes (USEPA 600/4-79-020).

3. Test Methods for Evaluating Solid Waste (USEPA SW-846).

a. Standard Methods for the Examination of Water and Waste, 16 ed, (1983).

b. Standard Methods for the Examination of Water and Waste, 17 ed, (1989)/18ed (1992).

c. Method of Soil Analysis, Part 1, Physical and Mineralogical Methods, 2nd ed, (1986).

d. Method of Soil Analysis, Part 2, Chemical and Microbiological Properties, Am. Soc. Agron., Madison, WI (1965).

e. USEPA Contract Laboratory Program, Statement of Work for Inorganic Analysis.

f. Code of Federal Regulations.

1999 Wet Chemistry MDLs

PARAMETER	Methods	Date	Analyst	spike ppm	1	2	3	4	5	6	7	units	Ave	SD	MDL WATER	SOIL FACTOR	MDL SOIL
															(mg/L)		(mg/Kg)
zinc (color) soil ***	Air force method	10/13/99	RDB	2.50	(0.00)	2.95	1.92	1.88	2.81	1.81	1.17	mg/Kg	2.09	0.672	NA	1.0	2.3

Hydrazine, sample #1 appears to have not been spiked, and has been excluded from the statistics as an outlier. The MDL is calculated from the other 6 values, using the student t-factor for 6 measurements.

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101
WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0W9P9	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.0	u	MG/KG	1.0	1.0
-002	B0W9R0	% Solids	88.6		%	0.01	1.0
		Hydrazine	3.0		MG/KG	1.0	1.0
-003	B0W9R1	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.9		MG/KG	1.0	1.0
-004	B0W9R2	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.9		MG/KG	1.0	1.0
-005	B0W9R3	% Solids	88.6		%	0.01	1.0
		Hydrazine	2.8		MG/KG	1.0	1.0
-006	B0W9R4	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.8		MG/KG	1.0	1.0
-007	B0W9R5	% Solids	88.6		%	0.01	1.0
		Hydrazine	1.2		MG/KG	1.0	1.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	99LHZ002-MB1	Hydrazine	1.0 u	NG/KG	1.0	1.0

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 12/28/99

CLIENT: TNU-HANFORD B99-079 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
BLANK10	99LHZ002-MB1	Hydrazine	5.0	1.0 u	5.0	99.1	1.0
		Hydrazine MSD	5.0	1.0 u	5.0	100.5	1.0

Recra LabNet - Lionville

INORGANICS DUPLICATE SPIKE REPORT 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%DIFF
BLANK10	99LHZ002-MB1	Hydrazine	99.1	100.5	1.4

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 12/28/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9909L101

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-007RE9	B0W9R5	% Solids	88.6	89.5	1.0	1.0

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD B99-078

DATE RECEIVED: 09/03/99 RFW LOT # :9909L101

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
B0W9P9						
% SOLIDS	001	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	001	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R0						
% SOLIDS	002	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	002	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R1						
% SOLIDS	003	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	003	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R2						
% SOLIDS	004	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	004	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R3						
% SOLIDS	005	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	005	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R4						
% SOLIDS	006	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	006	S	99LHZ002	09/01/99	10/13/99	10/13/99
B0W9R5						
% SOLIDS	007	S	99L%S124	09/01/99	09/17/99	09/20/99
% SOLIDS	007 REP	S	99L%S124	09/01/99	09/17/99	09/20/99
HYDRAZINE	007	S	99LHZ002	09/01/99	10/13/99	10/13/99
LAB QC:						
HYDRAZINE	MB1	S	99LHZ002	N/A	10/13/99	10/13/99

Recra LabNet - Lionville Laboratory
INORGANIC ANALYTICAL DATA PACKAGE FOR
TNU-HANFORD B99-078

DATE RECEIVED: 09/03/99 RFW LOT # :9909L101

CLIENT ID /ANALYSIS	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
HYDRAZINE	MB1 BS	S	99LHZ002	N/A	10/13/99	10/13/99
HYDRAZINE	MB1 BSD	S	99LHZ002	N/A	10/13/99	10/13/99

RECRA LabNet Use Only

9909L101

(8) perver...

Custody Transfer Record/Lab Work Request

RECRA LabNet

Client TMM-Hanford B99-078
Est. Final Proj. Sampling Date
Project # 10985-001-001-9999-00
Project Contact/Phone #
RECRA Project Manager DJ
QC Spec Del Std TAT 30 days
Date Rec'd 9/3/99 Date Due 10/3/99
Account # 9/3 PM 9/12/99 10/3/99

Refrigerator # 6
#/Type Container Liquid / Solid 6
Volume Liquid / Solid 20
Preservatives

ANALYSES REQUESTED → ORGANIC: VOA, BNA, Pest/PCB, Herb; INORG: Metal, CN

MATRIX CODES: S - Soil; SE - Sediment; SO - Solid; SL - Sludge; W - Water; O - Oil; A - Air; DS - Drum Solids; DL - Drum Liquids; L - EP/TCLP Leachate; WI - Wipe; X - Other; F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	RECRA LabNet Use Only (1/4/V2U)
001	BOW9P9			S	9/1/99	0736	✓
2	R0						
3	R1						
4	R2						
5	R3						
6	R4						
7	R5						

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:

Saf# B99-078

COMPOSITE WASTE

DATE/REVISIONS:

1. Run matrix QC
2. 9/3/99 Date rec'd - 9/3/99
3. Hydrazine MDL Study
4.
5. Samples relogged from
6. batch 9909L007-99PM229

Relinquished by	Received by	Date	Time
Reloy	Jonson	9/3/99	—

Relinquished by	Received by	Date	Time
	ORIGINAL		
	REWRITTEN		

RECRA LabNet Use Only

Samples were: 1) Shipped ___ or Hand Delivered ___ Airbill # _____ 2) Ambient or Chilled 3) Received in Good Condition Y or N 4) Labels Indicate Properly Preserved Y or N 5) Received Within Holding Times Y or N

COC Tape was: 1) Present on Outer Package Y or N 2) Unbroken on Outer Package Y or N 3) Present on Sample Y or N 4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec't Y or N

Discrepancies Between Samples Labels and COC Record? Y or N NOTES:

Page 1 of 1

Jun-06-00 13:12 From-RECRA ENVIRONMENTAL INC T-076 P.14/14 F-561 6102803041